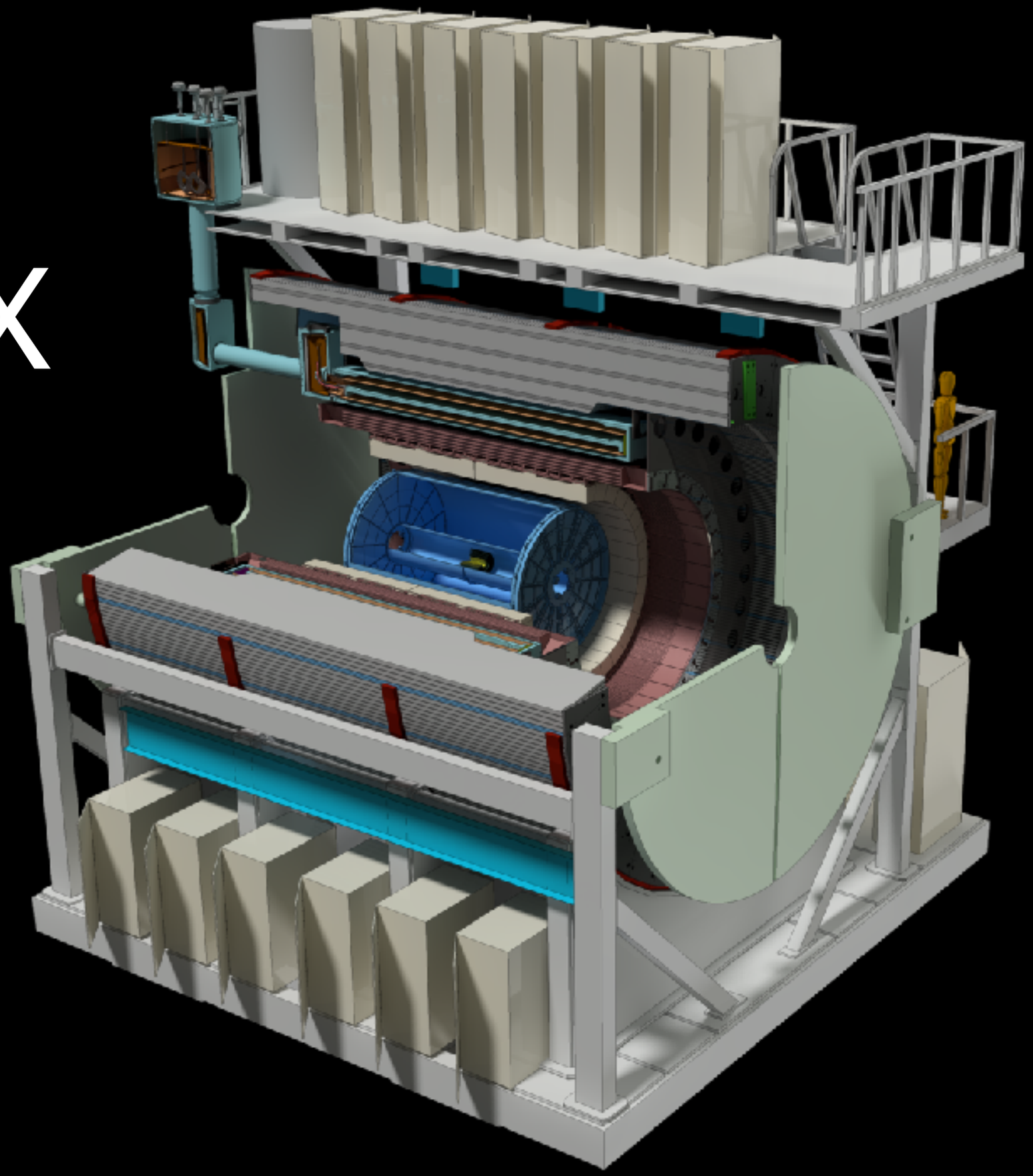
sPHENIX status

Dave Morrison (BNL)
Gunther Roland (MIT)
January 24, 2017



sPHENIX Status

- With LBNL, UCB and Temple joining, sPHENIX scientific Collaboration stands at 63 institutions and 230 collaborators
- FNAL test beam activity is underway, focused on evaluating high η calorimeter performance
- QM'17: one talk (Megan Connors), 16 posters
- Looking for speakers for:
  - EIC physics and sPHENIX at DIS 2017
  - sPHENIX overview at the Santa Fe Jets and HF workshop
- Project readying for CD-1 review – marching through L2 managers, practicing presentations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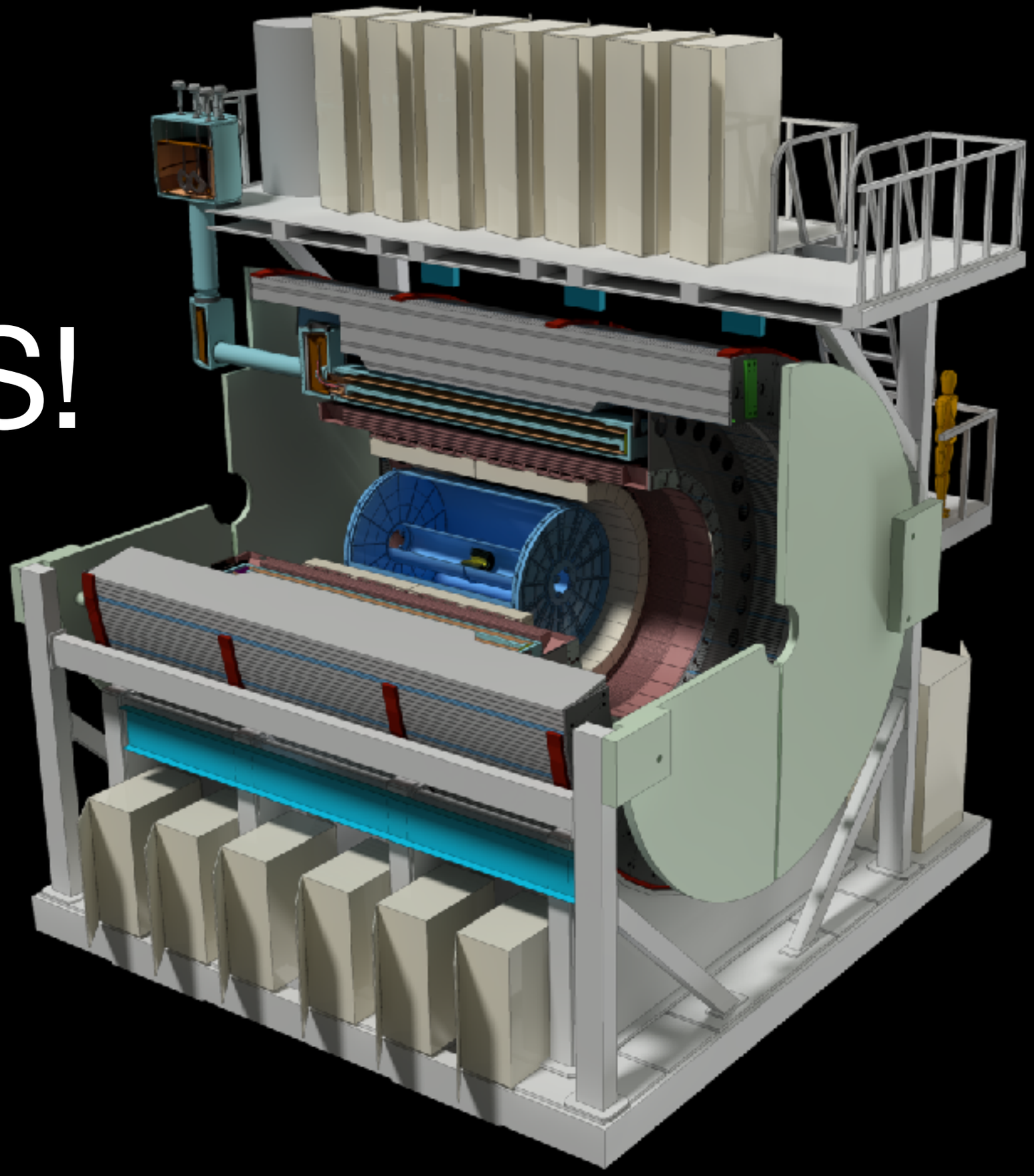
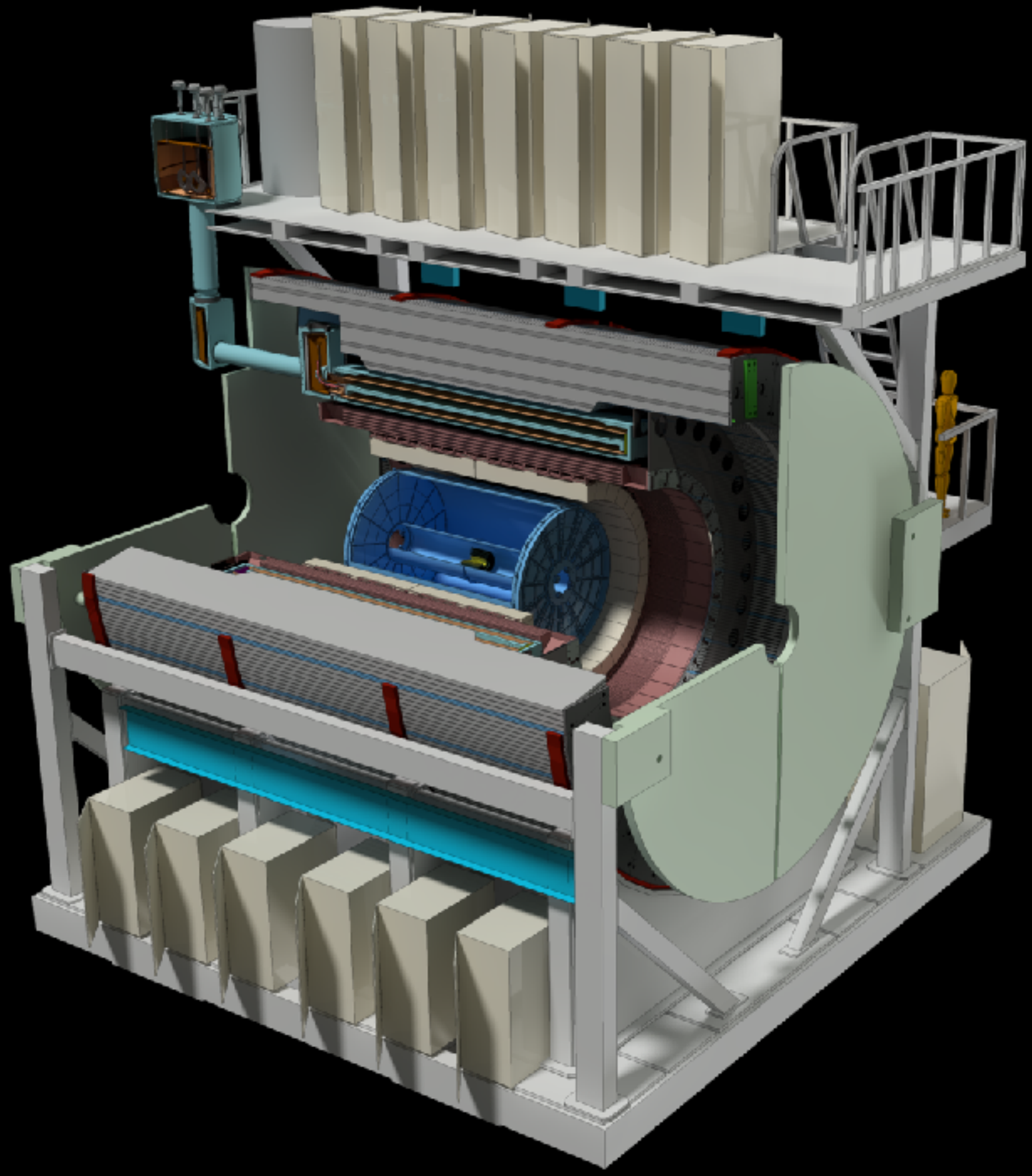
(some assembly required)

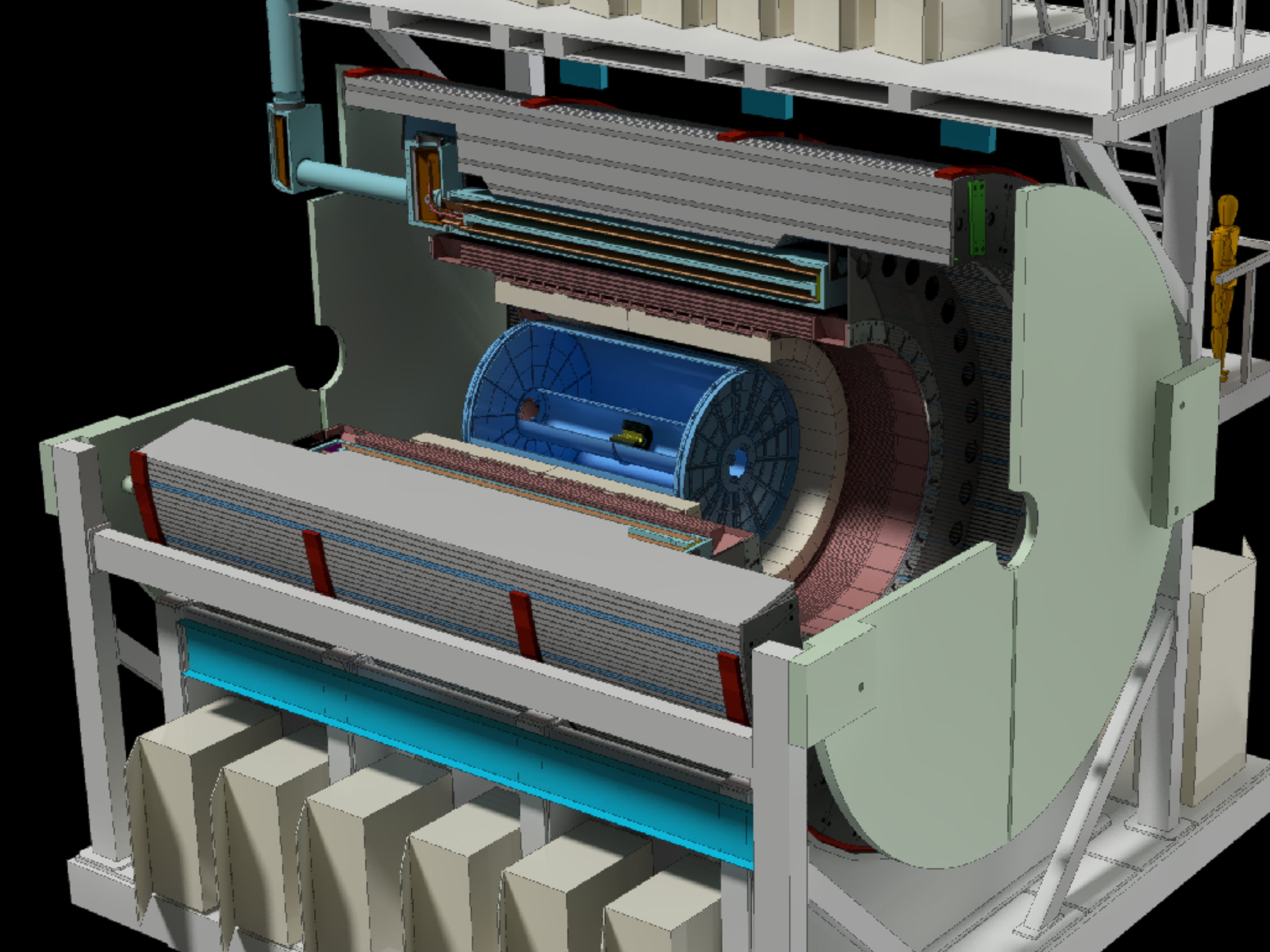
test beam panorama

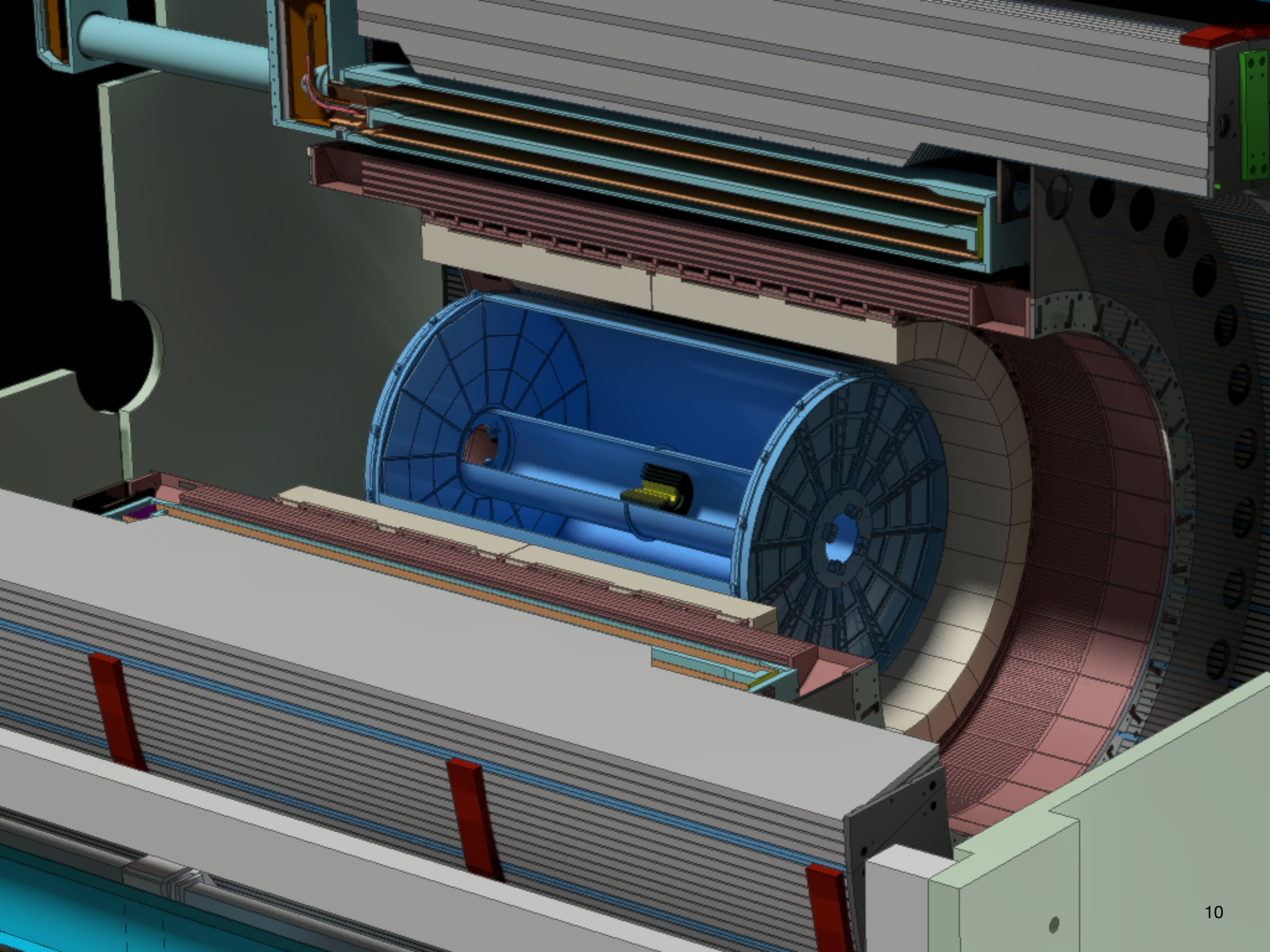
MAPS!

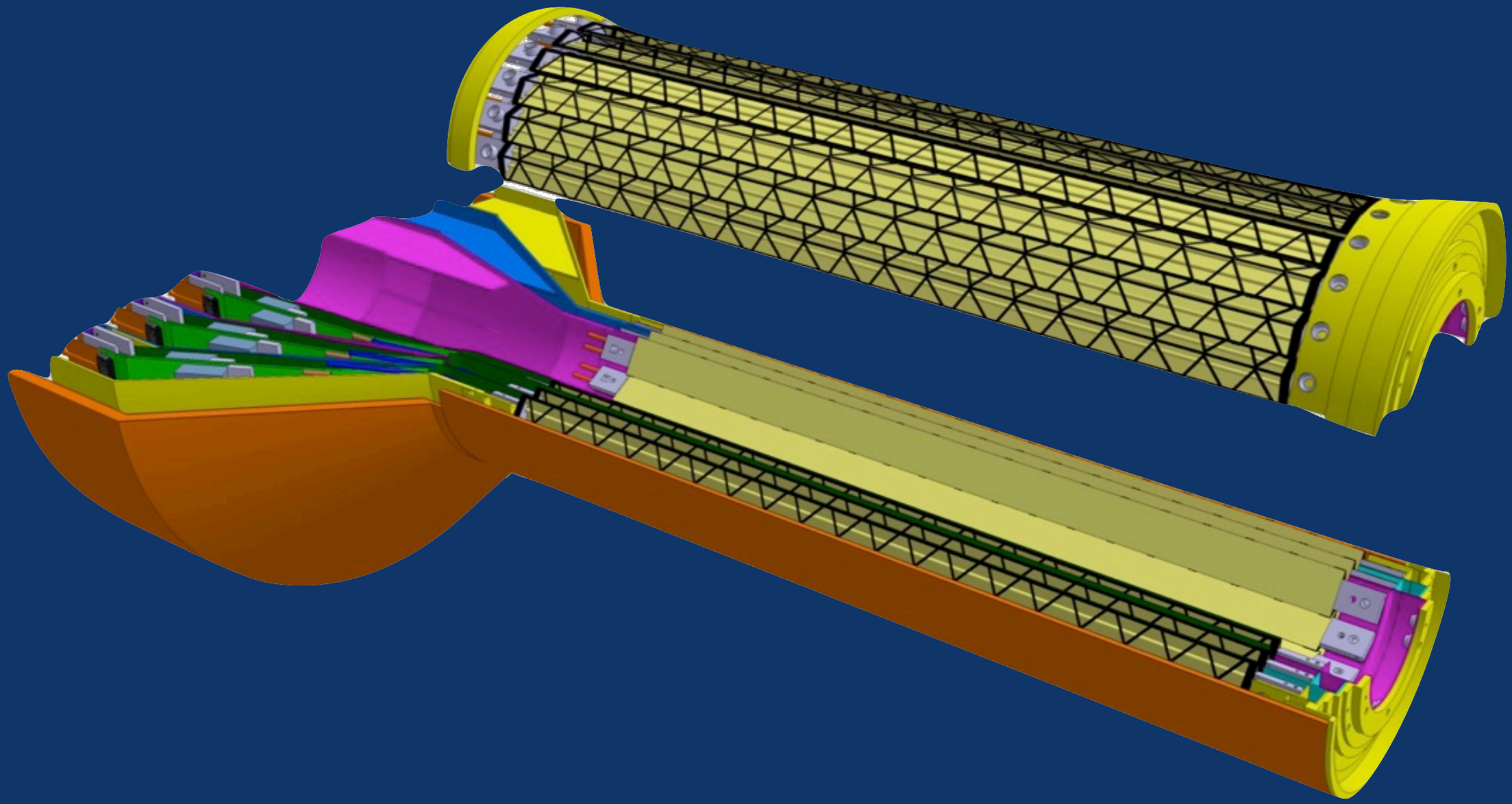




[♫ ♩ sound of theme to “Jaws” ♫ ♩]



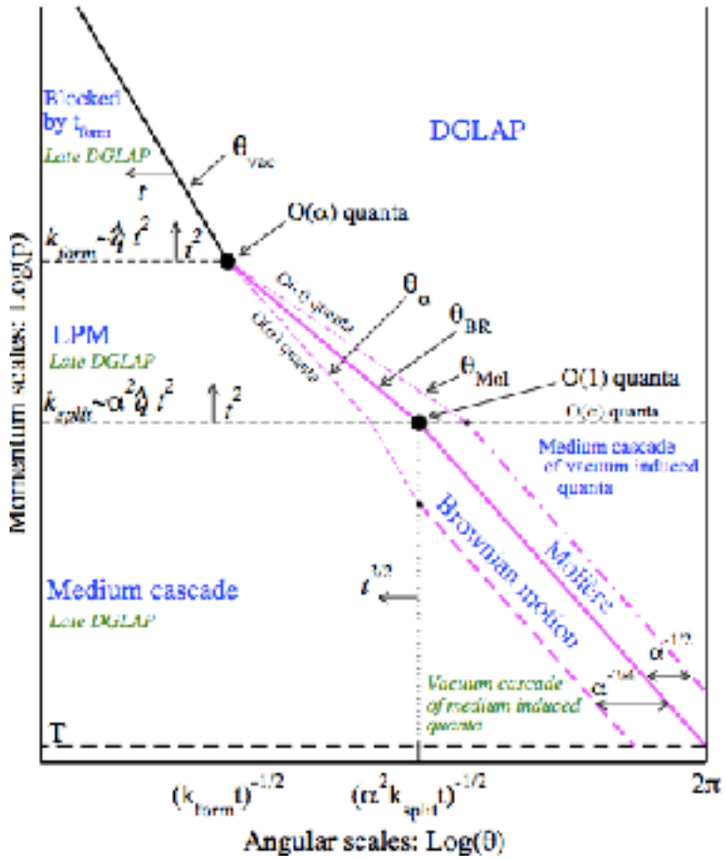


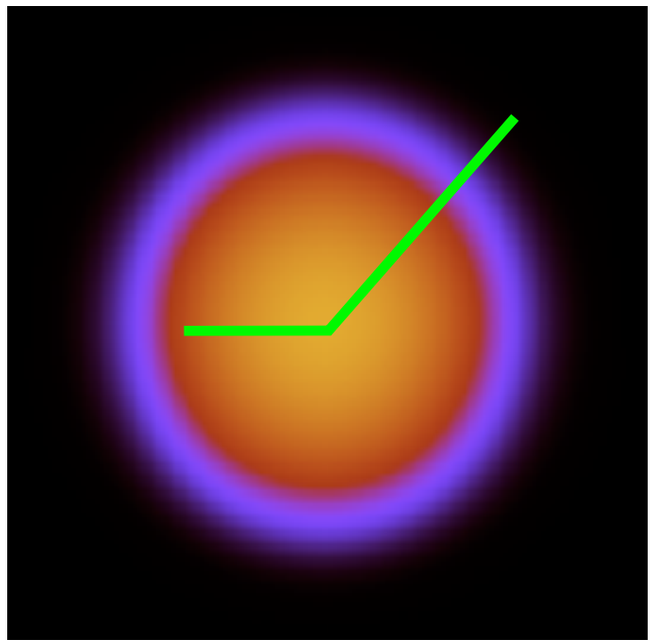


Multi-scale probes of QGP

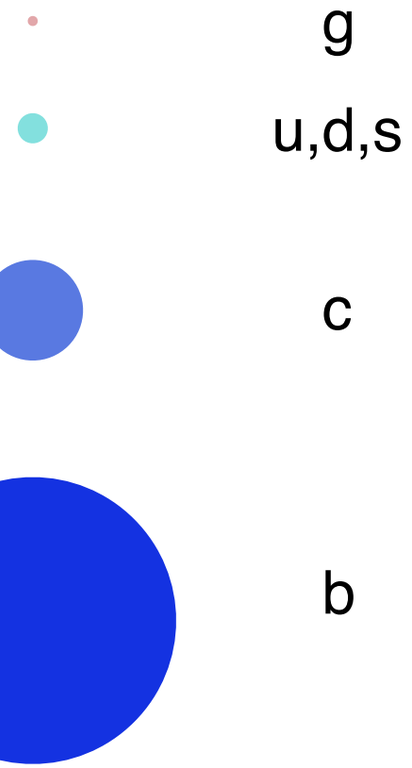
Three key approaches to study
QGP structure at multiple scales

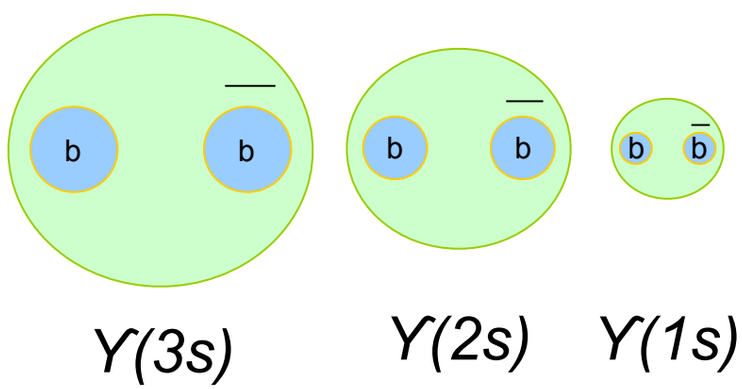
Jets and jet structure





Parton mass/flavor

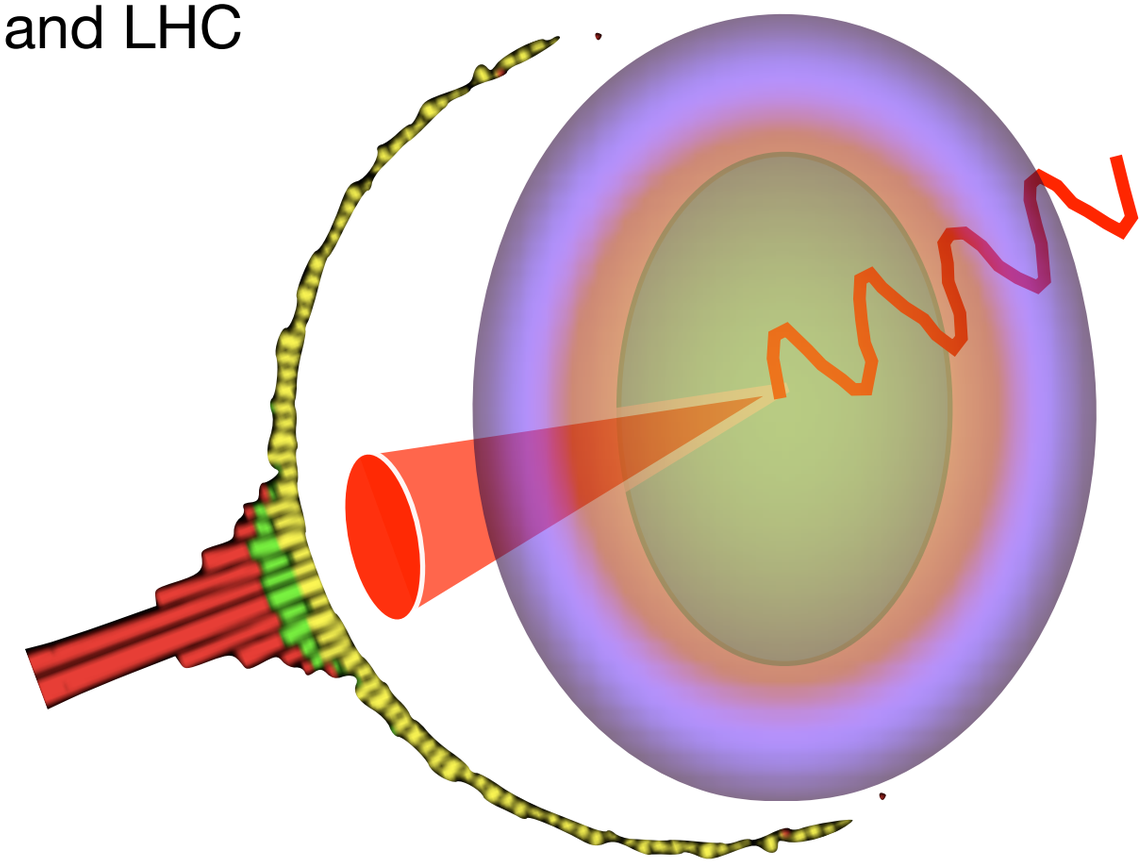




Upsilon spectroscopy

Physics drives detector requirements: Jets and HF

Unified approach to jet physics at RHIC and LHC



Use away- and near-side tags to control initial hard system:

- Parton flavor and mass
- Initial momentum
- Pathlength
- In-medium evolution
- Initial and final state radiation

➜

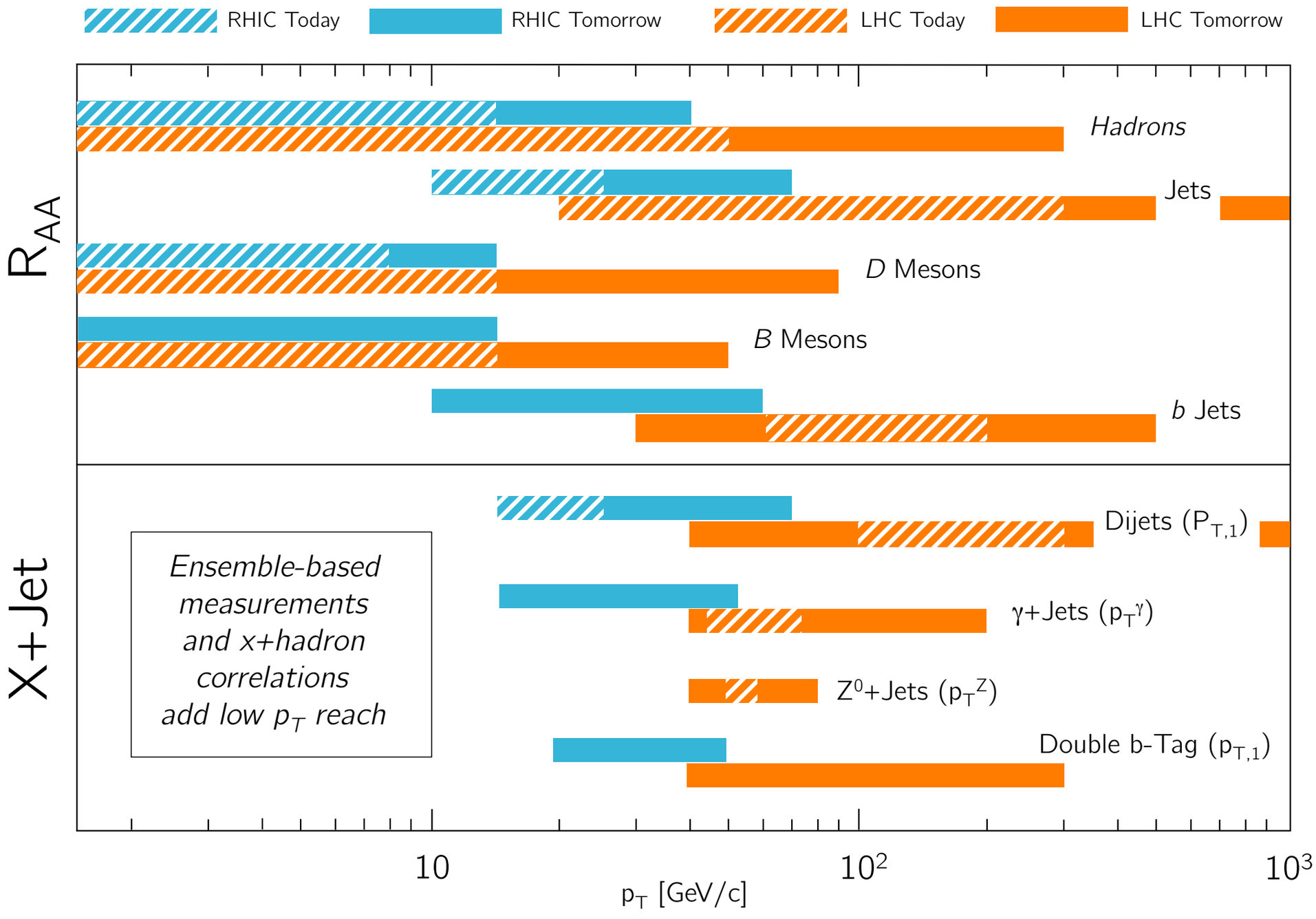
Photon and HF tagging
HF meson reconstruction
High rate
Control over jet energy scale

Fully characterize momentum flow near the jet, both "in-cone" and "out-of-cone"➜

Full azimuthal coverage w/ tracking and calorimetry
Large acceptance in p_T and rapidity
High tracking efficiency, low fake rate

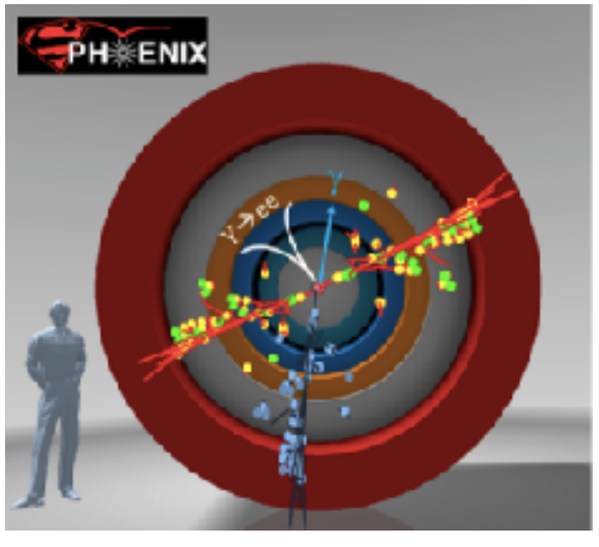
TOMOGRAPHY
: a method of producing a three-dimensional image of the internal structures of a solid object by the observation and recording of the differences in the effects on the passage of waves of energy impinging on those structures

Physics drives detector requirements: RHIC ⊕ LHC



Physics drives detector requirements

Physics goal	Detector requirement
High statistics for rare probes	Accept/sample full delivered luminosity Full azimuthal and large rapidity acceptance
Precision Upsilon spectroscopy	Hadron rejection > 99% with good $e^{+/-}$ acceptance Mass resolution 1% @ m_Υ
High jet efficiency and resolution	Full hadron and EM calorimetry Tracking from low to high pT
Control over parton mass	**Precision vertexing for heavy flavor ID**
Control over initial parton p_T	Large acceptance, high resolution photon ID
Full characterization of jet final state	High efficiency tracking for $0.2 < p_T < 40$GeV



MAPS and sPHENIX

- Precision vertexing is absolutely essential to the sPHENIX physics program
  - as a Collaboration, we insisted on including MAPS even in our answer to a difficult budget exercise from the ALD last Spring
- The baseline detector (i.e., the elements funded directly from RHIC Ops) includes a limited Ω MAPS “telescope” to ensure that the capability is an integral part of the baseline

Getting to the pre-proposal

- We have the right set of people here:
  - know the physics
  - know the technology
  - are project savvy
- I’m sure everyone has come prepared to write!